

ENVIRONMENTAL ASSESSMENT

Cooperative Gypsy Moth Project For Indiana 2001

by

**Indiana Department of Natural Resources
Division of Forestry**

**Indiana Department of Natural Resources
Division of Entomology & Plant Pathology**

**United States Department of Agriculture
Forest Service**

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Animal & Plant Health Inspection Service**

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1.0 PURPOSE AND NEED FOR ACTION

1.1 Proposed Action

The Indiana Department of Natural Resources (IDNR), Division of Forestry and Division of Entomology & Plant Pathology, proposes a cooperative project with the United States Department of Agriculture (USDA) [Forest Service (USFS) and Animal & Plant Health Inspection Service (APHIS)] to treat the gypsy moth populations at five sites in four counties (see maps in Appendix B). Gypsy moth populations proposed for treatment cover an estimated 1,867 acres (Table 1). The preferred alternative for this project is Alternative 4: Btk or mating disruption. Appendix E discusses the site not included in the proposed cooperative project.

Table 1. Proposed Treatment Sites for 2001.

COUNTY	PROPOSED SITES	ACRES	TREATMENT
Hendricks	Brownsburg	389	Mating Disruption
Kosciusko	Pierceton	78	Mating Disruption
Kosciusko	Syracuse South/Lake Wawasee	408	Mating Disruption
Lake	Cedar Lake	953	Mating Disruption
Noble	Kendallville	39	Btk
TOTAL Mating Disruption		1,828	
TOTAL Btk		39	
TOTAL Sites Proposed for Cooperative Project		1,867	

1.2 Project Objective

The objectives for this cooperative project are to eradicate gypsy moth populations in the uninfested area (e.g., Hendricks County) and to slow-the-spread of the gypsy moth populations in the transition area (e.g., Lake, Kosciusko, and Noble Counties) by eliminating reproducing populations from the proposed treatment sites.

1.3 Need for Action

The reason that these actions are being proposed is that gypsy moth is not native to the United States, and it lacks effective natural controls. The caterpillars feed on the foliage of many host plants. Oaks are the preferred host species, but the caterpillars defoliate many species of trees and shrubs when oak is not available. As the caterpillars grow older, their host preference may change to include evergreens. Also, high numbers of gypsy moth caterpillars can cause a substantial public nuisance, a reduction in tree growth, branch dieback and tree mortality, and damage to forests and urban trees that diminishes environmental quality and may affect human health and local economies.

The State of Indiana, with the IDNR, Division of Entomology and Plant Pathology as the lead agency, is dedicated to preserving urban and rural forested habitats from damage by gypsy moth and to enforcing interstate and intrastate quarantines to further protect areas not currently infested by this pest.

If no action is taken, gypsy moth will increase and spread, and defoliation will occur sooner. Therefore, the "no action" alternative is not preferred due to local officials and citizen desire to eliminate the isolated infestations, prevent human discomfort associated with infestations, delay damage to local plant communities and reduce spread to adjacent uninfested areas.

1.4 Decisions to be Made and Responsible Officials

The preferred alternative in this document proposes cooperative participation of the USFS, APHIS and the IDNR in treating gypsy moth populations in Indiana. The decision to be made by the responsible USDA officials is to choose which of the alternatives presented in this document best fulfills the objectives of the proposed action, and thus the needs of the people of Indiana. In addition, the decision will have to be made as to whether or not any perceived significant environmental impacts could result from the implementation of this project. If there are none, this will be documented in a Decision Notice and FONSI (Finding of No Significant Impact). If there are perceived significant environmental impacts and the project is to continue, an Environmental Impact Statement (EIS) would have to be prepared.

The alternatives analyzed for this environmental assessment are: 1) No cooperative project (No Action); 2) Btk; 3) Mating disruption; 4) Btk or mating disruption using pheromone flakes (Preferred Alternative).

The responsible USDA officials who will make this decision are:

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1.5 Scope of the Analysis

A final environmental impact statement (FEIS), developed by APHIS and USFS, entitled Gypsy Moth Management in the United States: a cooperative approach (USDA 1995) was made available in November 1995. The Record of Decision for the FEIS was signed in January of 1996 (USDA 1996), and Alternative 6 was selected, which includes all three management strategies analyzed – suppression, eradication, and slow-the-spread. These strategies depend upon the infestation status of the area: generally infested, uninfested, and transition. Implementation of the FEIS preferred alternative requires that a site-specific environmental analysis be conducted to address local issues before federal or cooperative projects are conducted. This site-specific analysis is tiered to the programmatic environmental impact statement (USDA 1995). As part of the analyses conducted for the FEIS, human health and ecological risk assessments were prepared. (Human Health Risk Assessment, Appendix F to the FEIS and Ecological Risk Assessment, Appendix G to the FEIS). The purpose of tiering is to eliminate repetitive discussions of the issues addressed in the FEIS (40 CFR, 1502.20 and 1508.28 in Council on Environmental Quality, 1992).

1.6 Summary of Public Involvement and Notification

Public meetings were held during January 2001 (Table 2). At each meeting, state officials presented alternatives for gypsy moth management to community leaders, local interest groups, and local residents. Notices were mailed or hand delivered to community leaders, elected officials, interested groups, residents and to the local news media. The discussion included: What gypsy moth is, Why it's a pest, and how we found it. The proposed actions and alternatives, including no action, were discussed. Local issues, questions, and concerns raised at the public meetings are in Appendix A.

Table 2. Date and number attending public meetings in each county.

COUNTY	DATE OF PUBLIC MEETING	# OF ATTENDEES
Hendricks	January 10, 2001	43
Kosciusko	January 31, 2001	8
Noble	January 30 , 2001	17
Lake	January 29, 2001	7

Information gathered at the public meetings and from resource professionals was used to develop issues and concerns related to the project. They are grouped into two categories; 1) issues used to formulate alternatives, and 2) other issues and concerns.

1.7 Issues Used to Formulate the Alternatives

Each of the major issues is introduced in this section. Discussion pertaining directly to each issue as it relates to the alternatives can be found in Chapter 4.

Issue 1. Human Health and Safety. Three types of risk are addressed under this issue: 1) an aircraft accident during applications, 2) treatment materials and potential effects on people, and 3) the future effects of gypsy moth infestations on people.

Issue 2. Effects on Nontarget Organisms and Environmental Quality. The major concerns under this issue are 1) the impact of treatment materials to nontarget organisms, including threatened and endangered species, that may be in the treatment sites, and 2) the future impacts of gypsy moth defoliation on the forest resources, water quality, wildlife and other natural resources.

Issue 3. Economic and Political Impacts of Treatment vs. Non-Treatment. Gypsy moth outbreaks can have significant economic impacts due to effects on the timber resource, nursery and Christmas tree producers, and recreational activities. An additional economic impact is a gypsy moth quarantine imposed to regulate movement of products from the forest, nursery and recreational industries to uninfested areas.

Issue 4. Likelihood of Success of the Project. Reducing the spread rate of gypsy moth within Indiana is the objective of this project. Alternatives vary in their likelihood of success for the current situation in Indiana. Consideration of project success is important for delaying gypsy moth impacts to Indiana and neighboring states.

1.8 Other Concerns and Questions

Concerns and questions were discussed during the public meetings. They were used to develop mitigating measures, management requirements and constraints. They are presented in Appendix A. Other agencies were consulted, and their information was used to develop mitigating measures, management requirements and constraints. See Appendix C for their comments.

1.9 Summary of Authorizing Laws and Policies

State. The division director (State Entomologist) may cooperate with a person in Indiana to locate, check, or eradicate a pest or pathogen (Indiana Code 14-24-2-1). The division director may, on the behalf of the department, enter into a cooperative agreement with the United States government, the government of another state, or an agency of the United States or another state to carry out this article (Indiana Code 14-24-2-2). Aerial applicators must meet Indiana Pesticide Use and Application Law (Indiana Code 15-3-3.6) to provide safe, efficient and acceptable applications of pesticides. The Non-Game and Endangered Species Conservation law (Indiana Code 14-22-34) applies to this project.

Federal. Authorization to conduct treatments for gypsy moth infestations is given in the Plant Protection Act of 2000 (7 U.S.C. section 7701 et.seq.).

The Cooperative Forestry Assistance Act of 1978 provides the authority for the USDA and state cooperation in management of forest insects and diseases. The law recognizes that the nation's capacity to produce renewable forest resources is significantly dependent on non-federal forestland. The 1990 Farm Bill (P.L. 101-624) reauthorizes the basic charter of the Cooperative Forestry Assistance Act.

The National Environmental Policy Act (NEPA) of 1969 (P.L. 91-190), 42 USC 4321 et.seq. requires detailed environmental analysis of any proposed federal action that may affect the human environment. The courts regard federally funded state actions as federal actions.

The Federal Insecticide, Fungicide and Rodenticide Act of 1947, (7 USC 136) as amended, known as FIFRA, requires insecticides used within the United States be registered by the United States Environmental Protection Agency (EPA).

Section 7 of the Endangered Species Act prohibits federal actions from jeopardizing the continued existence of federally listed threatened or endangered species or adversely affecting critical habitat of such species.

Section 106 of the National Historical Preservation Act and 36 CFR Part 800: Protection of Historic Properties requires the State Historic Preservation Officer be consulted regarding the proposed activities.

USDA Departmental Gypsy Moth Policy (USDA 1990) assigns the USFS and APHIS responsibility to assist states in protecting non-federal lands from gypsy moth damage.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 Process Used to Formulate the Alternatives

Staff entomologists and administration within the IDNR, Division of Entomology and Plant Pathology and the Division of Forestry in cooperation with USDA Forest Service and USDA-APHIS formulated several alternatives to treat the gypsy moth populations in Indiana under the eradication and slow-the-spread strategies. (See Chapter 6, Persons and Agencies Consulted).

The FEIS (USDA 1995), which this document is tiered to, allows the USDA to participate in the Cooperative Gypsy Moth Project for Indiana, 2001. The USDA can assist in conducting eradication, slow-the-spread and suppression strategies. The FEIS lists the treatment options for each of the strategies (USDA 1995, Vol. II, p.2-15). For eradication or slow-the-spread strategies, the following six treatment options may be considered: 1) *Bacillus thuringiensis* var. *kurstaki* (Btk), 2) diflubenzuron (Dimilin), 3) nucleopolyhedrosis virus (Gypchek), 4) mass trapping, 5) mating disruption (pheromone flakes), and 6) sterile insect release. These treatment options from the FEIS were used as the alternatives for the site-specific analysis of this Environmental Assessment.

2.2 Alternatives Eliminated from Detailed Study

The following alternatives that are available were eliminated from consideration:

Diflubenzuron (Dimilin). The label for diflubenzuron (Dimilin) prohibits its use over wetlands and directly to water. Some treatment sites contain lakes, marsh, rivers and/or wetlands. Therefore, its use was not considered for this project. This does not preclude the consideration and use of Dimilin in future projects.

Gypsy moth specific nucleopolyhedrosis virus (Gypchek). Gypsy moth nucleopolyhedrosis virus (Gypchek) has a very limited supply and is targeted for use in special areas that have high environmental concerns. There are questions as to the effectiveness in low-level gypsy moth populations. It is preferably used in suppression projects against moderate to high gypsy moth populations. Therefore, NPV is not considered for this project. In future projects, it will be evaluated for use.

Mass trapping. Mass trapping has proven capable of eradicating gypsy moth at low population levels in isolated introductions in small areas. Mass trapping requires placing 3-9 traps per acre (approximately 1,920 to 5,760 traps per sq.mi.). The number of traps for a mass trapping treatment would have a range of 117-351 traps in the smallest site to 2859-8577 traps in the largest site. For all sites, the total number of traps placed would range from 5601 to 16803. This would be logistically difficult and costly to perform. Mass trapping will be evaluated in future.

Sterile insect release. The FEIS documents the use of sterile insects for elimination of isolated gypsy moth populations. It also documents the obstacles of using this alternative - the limited release period; need to synchronize production of sterile pupae and release into the population; and the limited availability. This treatment alternative is currently not available and is not used in other eradication and slow-the-spread treatment projects. Giving consideration to these obstacles, the need

to repeat the release in future years, the relative population of gypsy moth in the treatment sites to surrounding detection survey results, and the lack of availability, this alternative was not considered for this project. In future projects, it will be evaluated for use.

2.3 Alternatives Considered in Detail

Alternative 1. NO ACTION. If no action is taken, the gypsy moth will reproduce and populations will begin to defoliate trees in the area. Gypsy moth populations will develop and spread to surrounding areas. This is not a preferred alternative because damage and regulatory action will occur sooner than if other alternatives are selected.

Alternative 2. Btk. This treatment option uses two aerial applications of Btk at 30 billion international units/acre (BIU). The applications would begin when leaf expansion is near 50% and when first and second instar caterpillars are present and feeding. This usually occurs between late April and late May in Indiana. The second application would follow 7-10 days after the first application. Most commercial formulations of Btk are aqueous flowable suspension (e.g., trade names: Dipel, Foray, Thuricide) with application rates of 8-40 BIU/acre (Appendix D – example of product labels). For aerial application at 30 BIU, less than 2.5 quarts of the product would be applied per acre.

Btk has been the most used treatment option in Cooperative Gypsy Moth Projects in Indiana and other states since 1989. Btk is a naturally occurring soil-borne bacterium that is mass-produced and formulated into a commercial insecticide. The Btk strain is effective against caterpillars, including the gypsy moth caterpillar. Btk is ingested by the caterpillar along with foliage. Once in the midgut, Btk becomes active and causes death within a few hours or days (USDA 1995, Vol. II, p. A3-A5). Btk may impact nontarget species of spring-feeding caterpillars in the treatment blocks, but the impact to the local population is usually very minimal as Btk rapidly degrades on the foliage within a few weeks and the nontarget lepidopterans re-colonize treatment sites generally within two to three years (USDA 1995, Vol. II, p. 4-52 to 4-55). Human exposure to Btk provides little cause for concern, though direct exposure to the spray may cause temporary eye and respiratory tract irritation in a few people (USDA 1995, Vol. II, p. 4-13). Btk applications can meet the project objectives of eliminating gypsy moth populations from the proposed treatment sites.

Alternative 3. Mating disruption using pheromone flakes. This treatment option uses one aerial application of pheromone flakes prior to the emergence of male moths. This would occur in mid June to early July. Mating disruption relies on the attractive characteristics of the gypsy moth sex pheromone, disparlure. The objective of mating disruption is to saturate the treatment area with enough pheromone sources to confuse the male moths and prevent them from finding and mating with female moths. Mating disruption is considered specific to gypsy moth and is not known to cause impacts to nontarget organism populations, water quality, microclimate, or soil productivity and fertility (FEIS, Vol. II, p. 4-67).

Mating disruption involves the aerial application of plastic flake dispensers that are impregnated with the gypsy moth pheromone. The formulation Disrupt II (see Appendix D – example of product labels), which is registered for use, consists of small plastic flakes, approximately 1/32 inch x 3/32 inch in size, thus the name pheromone flakes. A sticker, Monsanto's Gelva 2333, is applied to the

flakes as they are dispersed from the aircraft which aids in the distribution of the flakes throughout all levels in the forest canopy where mating could potentially occur. The flakes are green in color and will be applied at a rate of 30.4 grams active ingredient (disparlure) per acre (4 flakes per sq.ft.) or the equivalent of 167 grams of flakes applied in four fluid ounces of sticker per acre. All of the ingredients in the Gelva 2333 sticker are considered non-hazardous to public health if used as an additive in the insecticide formulation (40 CFR 180.1001)(Reardon et al. 1998). The application of pheromone flakes can meet the project objectives of eliminating gypsy moth populations from most of the proposed treatment sites.

Alternative 4. Btk or Mating Disruption using pheromone flakes (Preferred Alternative). This treatment option uses two applications of Btk at 30 BIU's on one treatment site and mating disruption using pheromone flakes on four treatment sites (Table 1). The use of this alternative provides flexibility to select Btk or pheromone flakes for each site based on the following criteria: 1) gypsy moth population level, 2) habitat type (urban or rural), 3) nontarget organisms, 4) safety, and 5) availability of pheromone flakes. The use of this alternative can meet the project objectives of eliminating gypsy moth populations from the proposed treatment sites.

2.4 Comparative Summary of Alternatives

Table 3. Summary of Environmental Consequences for Alternatives by Issues.

	Alternative 1 No Action	Alternative 2 Btk	Alternative 3 Mating disruption	Alternative 4 Btk or Mating disruption
Issue 1 Human Health & Safety	<ul style="list-style-type: none"> - No risk of an aircraft accident or spill. - No risk of Btk contact with humans. - Gypsy moth outbreaks will occur sooner with the associated nuisance and health impacts to humans. 	<ul style="list-style-type: none"> - Slight risk of aircraft accident and pesticide spill. - Contact with Btk may cause mild and temporary irritation (eye, skin & respiratory) to a few people. - Delay effect of gypsy moth outbreaks on humans. 	<ul style="list-style-type: none"> - Slight risk of aircraft accident. - No effect to human health. - Delay effect of gypsy moth outbreaks on humans. 	<ul style="list-style-type: none"> - Same as alternative 2 or 3 depending on the treatment at each site.
Issue 2 Effects on Nontarget Organisms & Environmental Quality	<ul style="list-style-type: none"> - No risk to threatened and endangered species. - No immediate impacts, however future gypsy moth impacts will occur sooner which includes defoliation and reduction in the oak component of forest stands. 	<ul style="list-style-type: none"> - No risk to Karner blue butterfly and Mitchell's satyr as neither species occur in or near treatment sites. - Direct impact on spring feeding caterpillars, temporary reduction in local populations. - Indirect impact on nontargets that feed on caterpillars is unlikely due to small percent of habitat treated. - Delay the impact of gypsy moth defoliation on environmental quality. 	<ul style="list-style-type: none"> - No risk to threatened and endangered species. - No risk or impact to nontarget organisms. - Delay the impact of gypsy moth defoliation on environmental quality. 	<ul style="list-style-type: none"> - Same as alternative 2 or 3 depending on the treatment at each site.
Issue 3 Economic and Political Impacts	<ul style="list-style-type: none"> - Regulatory action would occur sooner. - Spread of gypsy moth through these counties and into adjacent counties would not be slowed. 	<ul style="list-style-type: none"> - Regulatory action would not be implemented in these counties during 2001. - Slows the spread of gypsy moth. 	<ul style="list-style-type: none"> - Regulatory action would not be implemented in these counties during 2001. - Slows the spread of gypsy moth. 	<ul style="list-style-type: none"> - Regulatory action would not be implemented in these counties during 2001. - Slows the spread of gypsy moth.
Issue 4 Likelihood of Success of the Project	<ul style="list-style-type: none"> - Gypsy moth would not be eliminated from treatment sites and project objective would not be met. 	<ul style="list-style-type: none"> - Success is likely in the treatment sites. 	<ul style="list-style-type: none"> - Success is likely in the treatment sites. 	<ul style="list-style-type: none"> - Success is likely in the treatment sites.

3.0 AFFECTED ENVIRONMENT

3.1 Description of the Proposed Treatment Sites

Hendricks County: There are approximately 262,000 acres in Hendricks County, and 18,000 acres of forest.

Brownsburg: The proposed treatment site contains 389 acres. The site is a rural – urban area consisting of residential subdivisions, rural residences, crop and open fields and scattered manmade and natural ponds. The urban forest is composed of oak, maple, ash, ornamental trees, shrubs and other conifer and hardwood species. The White Lick Creek is outside the east boundary of the site. Gypsy moth was detected at this site in 1998 and delimited in 1999 and 2000. The moth catch in these surveys indicates a very low population. The eggmass survey detected very few eggmasses. The urban – rural forest habitat is not contiguous and may be limiting gypsy moth population development. Mating disruption using pheromone flakes is proposed for this site because the gypsy moth population is very low, very few eggmasses were detected, and the site is an urban-rural forest habitat.

Kosciusko County: There are approximately 344,000 acres in Kosciusko County, and 42,100 acres of forest.

Pierceton: The proposed treatment site contains 78 acres. The site is rural with a Cemetery at the center of the site. Hwy 13 runs north and south through the site. Rural residences are present in the site with conifer and hardwoods lining the residential properties. The site is composed of fields with scattered trees and trees in fence rows. The trees in the site are mostly hardwoods – maples, oak, ash, elm, other hardwoods and shrubs. Two ponds formed by old gravel pits are present in the site. Gypsy moth was detected in 1999 and delimited in 2000. A very low population was identified by these surveys and confirmed by an eggmass survey detecting very few eggmasses in the site. Mating disruption using pheromone flakes is proposed for this site because the gypsy moth population is very low and very few eggmasses were detected.

Syracuse/Lake Wawasee: The proposed treatment site contains 408 acres. The site is an urban forest on the southwestern shores of Lake Wawasee. The site is composed of residences, retail businesses, churches, golf course and cottages. The urban forest is composed of maple, ash, oak and other hardwoods. Lake Wawasee forms the north and east border. Gypsy moth was detected in 1998 and delimited in 1999 and 2000. The surveys detected a very low population that is not developing rapidly. Mating disruption using pheromone flakes is proposed for this site because the gypsy moth population is very low and Lake Wawasee is the treatment boundary on two sides of the site.

Lake County: There are approximately 320,500 acres in Lake County, and 18,500 acres of forest.

Cedar Lake: The proposed treatment site contains 953 acres. The site is forested and urban. The site is bisected north to south by Hwy 41 and is composed of residences, retail businesses, churches, factories, forests, open fields and crop fields. A High School is just outside the east treatment boundary. The lake named Cedar Lake is approximately 1 mile east of the site. Small

man made ponds occur in the site. The site is composed of maple, oak, ash, elm, some conifers and other hardwoods. Gypsy moth was detected in 1998 and delimited in 1999 and 2000. These surveys detected a very low population. Eggmass surveys failed to find eggmasses each year, however the delimit surveys found gypsy moth reproducing. Mating disruption using pheromone flakes is proposed for this site because the gypsy moth population is very low and no eggmasses were detected.

Noble County: There are approximately 264,000 acres in Noble County, and 33,600 acres of forest.

Kendallville: The proposed treatment site contains 39 acres. The site is within the city limits of Kendallville. The site is residential and contains the local hospital. The city park is between the hospital and Bixler Lake. Bixler Lake forms the east border of the site. The four acre area containing the hospital inside the site will not be treated. The urban forest is composed of oaks and maples. Conifers and other shrubs are found in the site. Gypsy moth was detected in 1999 and delimited in 2000. These surveys indicated the gypsy moth population was low but capable of developing quickly. The eggmass survey found preferred host trees (white oak) of gypsy moth with a high number of eggmasses such that all eggmasses could not be found and removed. Btk is proposed for this site because the gypsy moth population is above the threshold for application of mating disruption.

3.2 Threatened and Endangered Species

Consultation with the staff of the U.S. Fish and Wildlife Service determined that the federally endangered species Karner blue butterfly (*Lycaeides melissa samuelis*) and the Mitchell's satyr butterfly (*Neonympha mitchellii*) occur in Lake County but are not known to occur in or near the Cedar Lake site. "The known occurrence of these 2 endangered species are in the northern counties of Lake and Porter Counties (Karner blue) and LaPorte and LaGrange Counties (Mitchell's satyr). Neither species is known to occur near the sites identified in your letter. Spraying of Bt will occur at two of the six sites (Noble, Wabash and Huntington Counties), while the remainder of the sites will receive treatments of Disrupt II pheromone flakes, which are considered to be highly specific for gypsy moths with no adverse impacts on the federally listed butterflies." (Appendix C – U.S. Fish & Wildlife Letter).

The treatment sites are within the range of the federally endangered Indiana bat (*Myotis sodalis*), bald eagle (*Haliaeetus leucocephalus*) and copperbelly watersnake (*Nerodia erythrogaster neglecta*). Adverse effects are not likely to the above species due to the limited range of the proposed project. "Given the very limited range of the current program and the specificity of pheromone treatment, the proposed project is not likely to adversely affect these listed species." (Appendix C – U.S. Fish & Wildlife Letter).

The IDNR, Diversity and Habitat Protection Unit reviewed the project. The Unit determined that "The Natural Heritage Program's data indicate that the proposed treatment sites do not have any documented occurrence of state significant natural features including state or federally listed plant or animal species." (Appendix C – IDNR, Memo)

3.3 Protection of Historic Properties

Consultation with the State Historic Preservation Officer determined that no historic buildings, structures, objects, districts or archaeological sites listed in or eligible for inclusion in the Indiana Register of Historic Sites and Structures or the National Register of Historic Places will be affected by this project (Appendix C –IDNR Letter Division of Historic Preservation and Archaeology).

4.0 ENVIRONMENTAL CONSEQUENCES

This section is the scientific and analytic basis for the comparison of alternatives. It describes the probable consequences (impacts, effects) of each alternative for each issue. Environmental consequences are summarized in Table 2 for each combination of the alternatives and issues.

4.1 Human Health and Safety (Issue 1).

Alternative 1 - Under this alternative, there would be no cooperative aerial application project, therefore risk of human contact with pheromone flakes or Btk and an aircraft accident during application would not exist. However, future impacts by gypsy moth to human health will occur sooner under Alternative 1 than if treatments are used to slow-the-spread of these gypsy moth populations. Gypsy moth outbreaks have been associated with adverse human health effects, including skin lesions, eye irritation, and respiratory reactions. Gypsy moth caterpillars can become a serious nuisance that can cause psychological stress in some individuals (USDA 1995, Vol. II, p. 4-9).

Alternative 2 - Human exposure to Btk provides little cause for concern about health effects. “On the basis of both the available epidemiology studies as well as the long history of use, no hazard has been identified for members of the general public exposed to Btk formulations” (USDA 1995, Vol. III, p. 4-15). Exposure to Btk may result in temporary eye, skin, and respiratory tract irritation in a few people. A detailed analysis of the risks posed to humans by Btk was conducted for the FEIS -- Human Health Risk Assessment (USDA 1995, Vol. III). Glare and O’Callaghan provide a comprehensive review of *Bacillus thuringiensis*, including Btk. They conclude with this statement, “After covering this vast amount of literature, our view is a qualified verdict of safe to use.” (Glare and O’Callaghan, 2000)

A slight risk of an accident always exists when conducting aerial applications – Btk uses two applications. To further reduce this risk, a detailed work and safety plan is required prior to program implementation, which outlines guidelines for aircraft inspections, Btk loading, and conditions for safe applications. The effect of gypsy moth outbreaks on humans would be delayed using this alternative.

Alternative 3 - The toxicity of insect pheromones to mammals is relatively low and their activity is target-specific. Therefore the EPA requires less rigorous testing of these products than of conventional insecticides. Risk to human health due to exposure to disparlure, the active ingredient in pheromone flakes, is discussed in the FEIS (USDA 1995, Vol. II, pp. 4-30 to 4-32). Once absorbed through direct contact, disparlure is very persistent in humans, and individuals exposed to disparlure may attract adult male moths for prolonged periods of time. This persistence is viewed as

a nuisance and not a health risk (USDA 1995, Vol. III, 8-1). In acute toxicity tests, disparlure was not toxic to mammals, birds, or fish (USDA 1995, Vol. IV, 5-5) therefore no effects to human health are anticipated.

A slight risk of an accident always exists when conducting aerial applications – mating disruption uses one application. To further reduce this risk, a detailed work and safety plan is required prior to program implementation, which outlines guidelines for aircraft inspections, pheromone flake loading, and conditions for safe applications. The effect of gypsy moth outbreaks on humans would be delayed using this alternative.

Alternative 4 - Under this alternative, the one treatment site identified for Btk would have the human health and safety consequences stated above for Alternative 2. The four treatment sites identified for mating disruption would have the human health and safety consequences stated above for Alternative 3.

4.2 Effects on Nontarget Organisms and Environmental Quality (Issue 2).

Alternative 1 - With no treatments in 2001, future impacts by the gypsy moth would occur sooner. Defoliation by the gypsy moth will cause selective mortality of preferred host trees. During outbreaks, forest ecosystems can change due to a reduction of the oak component and an increase of tree species that are less desired by gypsy moth, such as maples and ashes. Oak forests would likely consist of a more mixed composition in the future, though oak would still be a component.

Gypsy moth defoliation and subsequent tree mortality can affect nontarget organisms by dramatically changing habitats on a local scale. Heavy defoliation can remove food for other leaf-feeding species, including other caterpillars. However, it can also create new habitat for some species by creating snags and increasing understory plant development by increasing light penetration into defoliated areas. Impacts on a larger scale (national, regional, or state) are subtle, gradual, and may be noticeable only after many years or decades (USDA 1995, Vol. II, p. 4-74). Short- and long-term changes in nontarget species have been shown for moderate and heavy defoliation (USDA 1995, Vol II, p. 4-47 and 4-50). An Ecological Risk Assessment (USDA 1995, Vol. IV) examined gypsy moth impacts on a wide variety of species (mammals, birds, reptiles, amphibians, fish, insects, mollusks, crustaceans, and other invertebrates). Further discussion of gypsy moth and its impact on forest conditions can be found in the FEIS (USDA 1995, Vol. II, p. 4-41 and 4-74).

Alternative 2 - Btk can have direct and indirect impacts on nontarget organisms. Direct toxicity of Btk is generally limited to the larval stage of moth and butterfly species. Btk is not toxic to vertebrates, honey bees, parasitic and predatory insects, and most aquatic invertebrates (USDA 1995, Vol. IV, p. 5-1). Btk has a direct adverse impact on caterpillars of moths and butterflies, but susceptibility varies widely among species. Btk, as used in gypsy moth projects, poses a risk to some spring-feeding caterpillars; however, permanent changes in their populations do not appear likely. An exception may occur in certain habitats that support small isolated populations of a particular species of moth or butterfly that is highly susceptible to Btk (USDA 1995, Vol. II, p. 4-54). The U.S. Fish and Wildlife Service identified two federally endangered butterflies - Karner blue butterfly (*Lycaeides melissa samuelis*) and the Mitchell's satyr butterfly (*Neonympha mitchellii*)

- in Lake County, but these species are not in the treatment site or the areas immediately around the treatment site. These species were not identified in any of the other treatment sites (Appendix C - U.S. Fish & Wildlife Letter). Thus, no potential exists for Btk to impact these populations directly.

Btk may have an indirect effect on other organisms by a reduction in their food resource (eg. caterpillars, pupae, or adult moths and butterflies). Any effects on vertebrates due to reduction in food availability are probably subtle, especially for mammals and birds that are very mobile. Populations of some gypsy moth parasites and some general lepidopteran parasites may be reduced, due to the reduction in number of potential hosts caused by the Btk spray (USDA 1995, Vol. IV, p. 5-7). The U.S. Fish & Wildlife letter identified the treatment sites within the range of the endangered Indiana bat, *Myotis sodalis*. Moths are the main food source for the Indiana bat. However, given the limited range of the current project, it is not likely that this project will adversely affect the Indiana bat. The U.S. Fish & Wildlife letter identified that the range of the bald eagle, *Haliaeetus leucocephalus*, and copperbelly watersnake, *Nerodia erythrogaster neglecta*, encompassed the treatment sites. "The proposed project is not likely to adversely affect these listed species." (Appendix C – U.S. Fish & Wildlife Letter).

Applications of Btk formulations do not increase levels of Btk in soil, and Btk persists for a relatively short time in the environment. Changes in soil productivity and fertility are not likely in the treatment sites, because Btk occurs naturally in soils worldwide. Additional information concerning the effects to soil can be found in Appendix G of the FEIS (USDA 1995, Vol. IV).

Application of Btk is likely to maintain the forest condition in the short-term by eliminating gypsy moth populations in the treatment sites, thus delaying gypsy moth from expanding and causing defoliation. However, in the long-term gypsy moth will very likely become well established in some of these counties, even if this alternative is implemented.

Alternative 3 - The pheromone in the flake dispenser is specific to gypsy moth and will not have an effect on other insects or threatened and endangered species of butterflies or moths.

A quantitative assessment of risk from mating disruption was not conducted for the FEIS because of disparlure's low toxicity to vertebrates and specificity to gypsy moth. As used in mating disruption, disparlure is not likely to impact nontarget organisms (USDA 1995, Vol. II, p. 4-67). The toxicity of insect pheromones to mammals is relatively low. In acute toxicity tests, disparlure was not toxic to mammals, birds, or fish (USDA 1995, Vol. IV, 5-5). At normal application rates, concentration of the pheromone (disparlure) impregnated in the flakes remains active for one season only. Therefore, no effects on nontarget organisms are anticipated from the proposed Disrupt II application.

Most ingredients in the flakes are insoluble in water, so the risk of disparlure leaching into groundwater is minimal. To determine the amount of disparlure that could potentially leach into water, 50 grams of flakes were submerged in 150 ml of water and vigorously agitated for 24 hours. Results indicate that less than 0.04% of the active ingredient (disparlure) contained in the flakes leached into water under these conditions. Disrupt II is applied at a dose of 30.4 grams of active ingredient (disparlure) per acre and 90% of the flakes are intercepted by and adhere to the forest canopy, where they remain until they have released most of the disparlure. Theoretically, if the dose

for an entire acre were accidentally applied over open water, only 0.012 grams of the applied dose would leach into the water.

Alternative 4 – Under this alternative, the treatment sites identified for Btk would have the nontarget and environmental consequences stated above for Alternative 2. The treatment sites identified for mating disruption would have the nontarget and environmental consequences stated above for Alternative 3.

4.3 Economic and Political Impacts of Treatment vs. Non-Treatment (Issue 3).

Alternative 1 – If no treatments were applied, the likely action would be to implement a quarantine in these counties during 2001. A quarantine would regulate firewood, logs, other timber products, mobile homes, recreational vehicles, trees and shrubs, Christmas trees, and outdoor household articles. This would create a financial impact to industries that deal with these products.

If current populations are not treated, they will continue to reproduce and grow in size. Defoliation would become noticeable in the future, but it would be difficult to predict exactly when noticeable defoliation would occur. Requests for federal assistance to suppress gypsy moth would be likely when defoliation occurs. Suppression projects are generally more expensive in total dollars than eradication projects because much larger areas are treated. The economic impact to state budgets would increase, as responsible agencies would need to administer and fund these suppression projects.

Following defoliation, negative financial impacts are likely to occur for recreational related industries such as resorts and campgrounds. Homeowners, private woodland owners, and forest-based industries could be affected by tree mortality, costs of treatment on personal property and health costs associated with caterpillar hairs.

Alternative 2, 3 and 4– If treatments are applied, regulatory action are not likely for these counties in 2001. Thus, the impacts listed under Alternative 1 would be avoided for 2001. Economic analysis from the Slow-The-Spread Program (STS) demonstrated the use of Btk, mating disruption and other STS technology reduced the spread of gypsy moth by as much as 60 percent (USDA 1997). The Eastern Plant Board recognized that the benefit of delaying gypsy moth resulted in an economic benefit of \$22.00 for each dollar invested in treatment cost and that the STS Program protected timber, recreation, and private property values (Eastern Plant Board 1997).

4.4 Likelihood of Success of the Project (Issue 4).

Alternative 1 - Project objectives would not be met with this alternative. Gypsy moth would not be eliminated from the treatment sites, and its population would serve as a source for increased spread within the counties and into surrounding counties. If these populations were allowed to increase and expand, gypsy moth could spread through the state in 10-15 years (USDA 1997)

Alternative 2 - Project success is likely with this alternative. Btk is effective in eliminating gypsy moth in the treatment sites.

Alternative 3 - Project success is likely with this alternative. Mating disruption using pheromone flakes has demonstrated elimination of gypsy moth in treatment sites at similar population levels.

Alternative 4 - Project success is optimized with this alternative when treatment selection criteria are used to determine the use of Btk or mating disruption for each site. Treatment selection criteria used to evaluate each site are: 1) gypsy moth population level, 2) habitat type (urban or rural), 3) nontarget organisms, 4) safety, and 5) availability of pheromone flakes.

4.5 Unavoidable Adverse Effects

No unavoidable adverse effects were identified for the proposed project.

4.6 Irreversible and Irretrievable Commitments of Resources

An irreversible commitment of resources results in the permanent loss of: 1) nonrenewable resources, such as minerals or cultural resources; 2) resources that are renewable only over long periods of time, such as soil productivity; or 3) a species (extinction) (USDA 1995, Vol. II, p. 4-93). Except for Alternative 1, there is an irreversible commitment of labor, fossil fuel, and money spent on the project.

An irretrievable commitment is one in which a resource product or use is lost for a period of time while managing for another (USDA 1995, Vol. II, p. 4-93). For this project, no irretrievable commitments were identified.

4.7 Cumulative Effects

No cumulative effects were identified for this proposed project. Cumulative effects are the incremental impacts of the action when added to past, present, and reasonably foreseeable future actions, that collectively are significant. For the proposed treatment sites, none have had previous gypsy moth treatments. Two previous treatments were in the vicinity of sites proposed for 2001. A site 0.25 miles north of the Kendallville site was treated with Btk in 1999, and a site 0.5 miles north of the Syracuse site was treated with pheromone flakes in 2000. An additional treatment site is proposed by the Indiana DNR during 2001 and has no previous gypsy moth treatment nor any treatment in the vicinity of the site (Appendix E). No gypsy moth treatments by the private sector are expected in the state during 2001.

4.8 Other Information

Mitigation

The Cooperative Gypsy Moth Project would implement the following safeguards and mitigating measures:

- The public will be notified of treatments and dates using news releases via local radio, TV and newspaper.
- Notice of treatment will be posted throughout each treatment site.
- Local safety authority will be notified by direct contact or phone calls.

- Employees of state and federal agencies monitoring the treatment will receive training on treatment methods to be able to answer questions from the public.
- Notification will contain information pertinent to the specific treatment, treatment boundaries, treatment schedule, and precautions to be taken.
- Application of Btk will be suspended when school children are present outside.
- Aircraft will be calibrated for accurate application of treatment material.
- Applications will be timed so the most susceptible gypsy moth stage is targeted.
- Weather will be monitored during treatment to assure accurate deposition of the treatment material.

Monitoring

During the treatments, ground observers and/or aerial observers will monitor the application for accuracy within the block perimeters, swath width, and drift. Application information (e.g. swath widths, spray-on and spray-off, acres treated, and altitude) will be downloaded to an operations-base computer.

The Btk treatment blocks will be monitored after treatments using pheromone traps on a 500-meter grid spacing to determine the effectiveness of the treatment project. This intensive monitoring would be conducted during the summer of 2001.

For the mating disruption sites, post-treatment evaluation using pheromone traps on a 500-meter grid spacing will be conducted during the summer of 2002, after the aerielly applied pheromone has had time to dissipate from the sites and would no longer conflict with the pheromone traps.

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7.0 REFERENCES CITED

Eastern Plant Board, 1997. Resolution # 2.

Glare, T.R. and M. O'Callaghan. 2000. *Bacillus thuringiensis*: Biology, ecology and safety. John Wiley & Sons, Ltd. New York, 350 pp.

Kreutzweiser, David P.; Capell, Scott S.; Thomas, David R.; Wainio-Keizer, Kerrie L. 1993. Effects of Btk on aquatic microbial activity, detrital decomposition, and invertebrate communities. NAPIAP Proj. NA-25. Forestry Canada, Forest Pest Management Institute, Sault Ste. Marie, Ontario.

National Environmental Policy Act (NEPA) of 1969 (P.L. 91-190), USC 4321 et.seq.

NRC (National Research Council). 1983. Risk Assessment in the Federal Government: managing the process. Washington, DC: National Academy Press; 176 p. +app.

Reardon, Richard C., et.al. 1998. Use of Mating Disruption to Manage Gypsy Moth: A Review. USDA-Forest Service, FHTET-98-01.

USDA. 1990. USDA Departmental gypsy moth policy.

USDA. 1995. Gypsy Moth Management in the United States: a cooperative approach. Final Environmental Impact Statement, Vols. I-V. USDA-Forest Service and USDA-APHIS.

USDA. 1996. Gypsy Moth Management in the United States: a cooperative approach. Record of Decision. USDA-Forest Service and USDA-APHIS.

USDA. 1997. Slowing The Spread Fact Sheet. U.S. Gov. P.O. 506-453.